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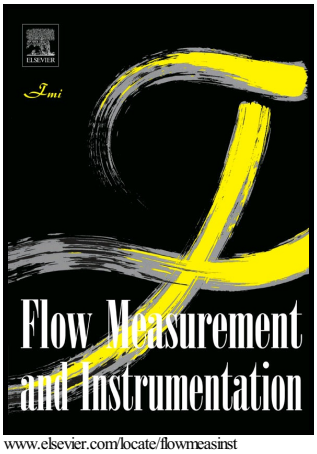

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Abstract: Two-dimensional or three-dimensional images from the electrical capacitance tomography (ECT) technology provide powerful evidences for revealing complicated mechanisms behind behaviors of tomographic objects. In order to satisfy the increasing demands of dynamic measurements in real-world industrial applications, in this paper a sequential dynamic imaging model is proposed to model the inverse problem with the focus on the ECT imaging, and a new cost function that encapsulates the temporal constraint, the reweighted L1 norm based spatial constraint and the reweighted nuclear norm based low rank constraint is constructed to convert the dynamic inversion problem into a minimization problem. A new algorithm that splits an intractable optimization problem into several simpler sub-problems is developed to solve the new cost function. Comprehensive evaluations of representative imaging targets and comparisons with state-of-the-art imaging algorithms demonstrate the superiorities of the imaging technique proposed in this study on improving the imaging quality and robustness.

Key words: Electrical capacitance tomography; Dynamic inversion technique; Optimization based imaging method; Cost function; Reweighted L1 norm; Reweighted nuclear norm; Iteration imaging algorithm

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